FACTORS INFLUENCING FARM ACCOUNTING SYSTEMS AND INFORMATION USAGE

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Abstract

Accounting methods of a stratified random sample of Ohio commercial farms were analyzed using logit and other statistical analysis techniques. Significant differences in accounting methods were found for farms having differing enterprises, sizes, and internal information uses.

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Farm financial stress during the 1980s has focused a great deal of attention on evaluating farm financial performance. Many financial models, primarily micro-computer based, have been developed to aid in analyzing financial performance (see, for example, Hawkins, Egbert, et. al., and Kesler, et. al.). One implicit assumption when using these methods is that the current financial position is known. If it is not known, financial analysis is very difficult and error prone. Reports from a farm's accounting system are the primary means for determining a farm's financial structure. In addition, accounting reports often are useful when analyzing many production and marketing decisions.

Therefore, a need for reliable information provided by the accounting system exists. Quantity and quality of accounting information vary greatly across farms. This variation may be due in part to farmers' perceived needs of accounting information. However, another important aspect is differing accounting requirements for various farm types. The latter point is particularly important when conducting educational programs directed towards farmers and when designing accounting systems for farms.

The objectives of this paper are to (1) describe accounting reporting procedures used on farms and (2) analyze the determinants of these procedures. To accomplish these objectives, responses from a survey of information usage on Ohio commercial farms were analyzed. The analysis was conducted making use of principles from accounting system development theory. These principles are briefly outlined in the next section. The second section describes the parts of the survey instrument pertinent to this study. Results are then presented in the third section.

Factors Influencing Accounting System Selection

An accounting system is a set of procedures and processes designed to collect, store, and process financial transactions into accounting reports. Reports include financial statements (i.e., balance sheets, income statements, and statements of changes in financial position), managerial reports (e.g., enterprise reports and cash flow reports), and income tax reports. Systems used, and reports generated, can and do vary greatly between farm firms (Arthur Andersen & Co.). System development theory divides factors influencing accounting system choice into two broad categories: firm characteristics and uses of reports (Wilkinson). In general, firm characteristics determine the amount and type of transactions data which must be processed, leading to different accounting systems. For farms, more important firm characteristics include (1) enterprises -- influences the type of transactions, (2) size -- influences the amount of transactions, and (3) business organization -- influences the complexity of reporting requirements.

Farms with similar firm characteristics, however, may still have different accounting systems. These differences are primarily due to the uses of reports made by two classes of users: outside entities and farm managers. Outside entities include tax authorities (Internal Revenue Service and state tax authorities), other governmental agencies, lenders, investors, and landlords. Meeting outside entity demands are minimal requirements of an accounting system and, in general, are fairly easy to meet. Differences result primarily from farm managers' use of accounting reports

Farm managers' use of reports vary greatly depending on the decisions made with accounting reports. Some farmers may not use accounting reports in decision-making, thus requiring no reports beyond those demanded by outside

users. Other farmers may use reports for financial analysis suggesting the need for financial statements. Other farmers may evaluate enterprise profitability and monitor cash flow with accounting reports, suggesting the need for managerial reports such as enterprise reports and cash flow statements.

Survey of Information Needs of Ohio Farm Managers

To test for differences in accounting systems based on firm characteristics and uses of reports, data from a information survey were used. A mail survey was sent to a stratified random sample of Ohio commercial farms during December 1987. The survey included questions addressing the usefulness of information sources, adequacy of information for types of decisions, computer and satellite dish usage, firm and business characteristics, usefulness of different information forms, and basis design of the accounting system.

As part of the survey, farmers were asked to choose one of seven accounting systems which best described their system. Choices are shown under "type of accounting system" in table 1. They ranged from a very informal system (check stubs, bills, and receipts) to systems that could be highly complex (computer system you designed). Accounting systems were divided into two categories. The first, labeled "low setup costs", included systems which required little time and effort to implement. On the other hand, systems with "high setup costs" required relatively more time and effort to implement. This distinction was made to separate farmers who had given system choice more consideration.

Farmers also were provided with a list of five reports and asked to indicate all that they prepared at least once per year (see "reports generated in table 1). In addition, they were asked to indicate which of eight potential uses they made of accounting reports (see "uses of reports" in table 1). Uses of reports were divided into two categories: "providing reports to" outside entities, and "internal uses".

Results of the Analysis

To analyze differences across enterprises, farms responding to the survey were divided into grain, dairy, and other categories. Grain farms raised at least 200 acres of cash crops and did not have any livestock enterprises. Selected dairy farms had at least 20 cows and did not have other significant livestock enterprises. Farms not falling in the grain or dairy categories were placed in the "other" category. These divisions were selected because grain and dairy farms have vastly different accounting requirements. Grain farms' production processes have a definite beginning (planting) and ending (harvesting) generally falling within one year. On the other hand, dairy farms deal with continuous production processes that cannot be divided easily into discrete periods. In addition, dairy farms usually have a significant crop enterprise. These factors suggest that accounting for dairy farms is more complex than for grain farms.

Table 1 shows types of accounting systems, reports generated, and uses of reports for the above farm breakdowns. All numbers within this table are given as percentages of farms within each category. For example, 23 percent of all farms responded that their accounting system could best be described as a "check stubs, bills, and receipts" system, while 24.7 percent of grain farms

indicated that this category best described their accounting system. Grain and dairy farm had approximately the same percentages of farms using low and high setup cost systems. However, percentages within the high setup cost category differed significantly. A higher percentage of dairy farms used computerized systems.

Reports generated by grain and dairy farms did not differ significantly. However, uses of reports did vary. A higher percentage of dairy farms provided reports to other governmental agencies. This is probably due to additional hired labor requirements, creating needs to file worker's compensation reports. Dairy farms tended to provide fewer reports to lenders and landlords. Internal use of reports were mixed. A higher percentage of dairy farms used accounting reports to analyze profitability while fewer dairy farmers monitored cash flows.

For grain and dairy farms, differences in accounting system were tested using the following logit model:

(1) $\ln(z_i) = a_1 + a_2 * size_i + a_3 * int_i + a_4 * num_i$

where

z_i equaled $p_i/(1-p_i)$ where p_i is the probability of having a high setup cost system (1c through 1g in table 1).

$size_i$ equaled farm size. Size is given in acres for grain farms and in number of cows for dairy farms.

int_i was a zero or one dummy variable. It equalled one if the farm used accounting reports for one of more internal uses (3f through 3h in table 1), and zero otherwise.

num_i was a zero or one dummy variable. It equaled one if the farm had more than one partner involved in the operation, and zero otherwise.

Grain Farms

Parameter estimates and asymptotic t-ratios (given in parentheses) for grain farms were:

$$(2)\quad \ln(z_i) = \underset{(3.1617)}{-1.8155} + \underset{(1.1053)}{.0064021} * size_i + \underset{(2.2226)}{1.1302} * int_i + \underset{(.56196)}{.28539} * num_i$$

This model correctly predicted 69 percent of the cases; however, the only variable's coefficient significant at a five percent level was the internal use coefficient.

Accounting systems, reports and uses for differing grain farm sizes is shown in table 2. Consistent with the logit results, notable differences in accounting systems did not exist across farm sizes. Grain farms greater than 1,000 acres tended to use accounting systems that had high setup costs. This variation is primarily due to the zero percent in "check stubs, bills, and receipts" system category. The remaining composition of accounting systems is relatively the same as those for smaller farms. Moreover, reports generated and uses of reports did not systematically vary across grain farm sizes.

Internal use had more of an effect on reports generated than it did on system type, as shown in the first two columns of table 3. Percentages are given for farms having between 400 and 800 acres. Grain farms using reports for internal purposes had fewer low cost accounting systems; however, accounting systems did not vary substantially between the two categories. But farms that used accounting reports internally tended to produce more reports; particularly cash flow and comparison of actual to projected cash flow reports.

Lack of major system differences over farm size and internal use is partially explained by the relative simpleness of grain farm accounting. Grain farms have few transaction and fixed assets remain fairly constant over time. Allocating direct costs to enterprise units -- such as farms, fields, or crops

-- is not difficult. It can be accomplished with relatively low demands on the accounting system.

Dairy Farms

Parameter estimates and asymptotic t-ratios (in parentheses) of the logit model for dairy farms were:

$$(3)\quad \ln(z_i) = \underset{(4.5207)}{-2.8860} + \underset{(2.7672)}{.024463} * size_i + \underset{(3.4434)}{1.4728} * int_i + \underset{(1.1086)}{.46329} * num_i$$

This model correctly predicted 81 percent of the farm cases. Unlike the grain farm model, the dairy model's size parameter was significant at a five percent level. In addition, the internal use parameter was significant at the same significance level. Comparison of the size and internal use parameter's magnitudes suggested that internal use was the more important of the two variables.

Systems, reports, and uses across dairy farm sizes are shown in table 4. As the logit model's results suggested, larger dairy farms have more accounting systems in the high setup cost category. In addition, larger farms tended to produce more reports than smaller farms. Both these trends are partially explained by the increasing complexity associated with size. Dairy farms with larger herd sizes also tended to farm more cropland. Thus, two size dimensions are inter-related. This factor, along with the continuous production process associated with dairy animals, suggests that larger dairy farms may need more complex systems.

A higher percentage of dairy farms used accounting reports for internal uses than did grain farms: 58 percent for dairy farms as compared to 48 percent for grain farms. The final two columns of table 3 show accounting systems and reports for dairy farms using and not using accounting reports. Percentages are given for dairy farms having between 40 and 60 cows. Note that

dairy farms using reports for internal purposes have a significantly higher percentage of systems in the high cost category, and also prepared more reports.

Also of interest is the types of reports prepared by dairy and grain farms, particularly those that used made some internal use of accounting reports. Dairy farms tended to focus more on profitability while cash grain farms focused more on cash flow. This difference may be explained by the large cash requirements at the beginning of grain farms' production processes. On the other hand, cash flows are much more evenly distributed over time for dairy farms.

Summary and Conclusions

Accounting system used and reports generated by farmers substantially vary from farm to farm. Farm size explains some of the variation. More important factors seem to be enterprises raised on the farm and whether or not reports are used for internal purposes. Those farmers making internal use of information tend to have more formal accounting systems and receive additional reports.

Results of the study have two implications. First, accounting systems should be designed for specific farms. An accounting system appropriate for a grain farm may not be appropriate for a dairy farm. Additional research developing appropriate systems should be undertaken. Second, extension education programs addressing farm accounting issues need to consider the diversity that exists. Dimensions to be considered include farm size, farm type, and use of accounting reports in decision-making.

Table 1. Accounting Systems, Reports, and Uses of Accounting Reports by Farm Type - Ohio, 1987.

	Farm Type			
	Total	Grain	Dairy	Other
No of farms	285	85	123	77
1. TYPE OF ACCOUNTING SYSTEM	% of farms			
a. check stubs, bills, and receipts	23.0	24.7	21.1	25.8
b. farm record book	41.9	41.6	43.9	41.9
Low Setup Costs	64.9	66.3	65.0	67.7
c. manual single entry[1]	16.3	20.3	13.0	19.3
d. manual double entry[1]	8.4	11.3	6.5	10.8
e. purchased computer system	4.4	0.0	5.7*	0.0
f. computer system you designed	3.2	1.1	4.9*	1.1
g. mail-in service	2.8	1.1	4.9*	1.1
High Setup Costs	35.1	33.7	35.0	32.3
2. REPORTS GENERATED				
a. enterprise budgets	25.4	20.0	22.2	21.6
b. balance sheets	62.4	67.1	59.5	66.2
c. income statements	79.8	77.6	79.4	78.4
d. cash flow budget	34.7	32.9	33.3	36.5
e. actual to projected cash flow	21.4	24.7	17.5	25.7
3. USES OF REPORTS				
Providing Reports To:				
a. tax authorities	94.7	94.3	93.4	94.6
b. gov't agencies	47.8	40.9	54.2*	41.9
c. lenders	61.5	70.5	55.7*	68.8
d. landlords	5.9	12.5	1.5*	11.8
e. investors	4.2	5.7	3.1	5.4
Internal Uses:				
f. analyzing profitability	27.8	20.5	30.5*	20.4
g. monitoring cash flow	39.3	48.9	36.6*	47.3
h. monitoring inventories	33.3	34.1	32.1	33.3

* Indicates dairy farms' mean is significantly different from the grain farms' mean at a ten percent significance level using a test based on binomial probability distributions (Hogg and Tanis, p. 343).

[1] These systems were designed by the farmer.

Table 2. Accounting Systems, Reports, and Uses of Accounting Reports by Size of Cash Grain Farm -- Ohio, 1987.

	Acres				
	200-400	400-600	600-800	800-1,000	>1,000
No of farms	26	24	12	11	12
1. TYPE OF ACCOUNTING SYSTEM	% of farms				
a. check stubs, bills and receipts	37.0	28.0	8.3	20.0	0.0
b. farm record book	40.7	40.0	50.0	50.0	36.4
Low Setup Costs	77.7	68.0	58.3	70.0	36.4*
c. manual single entry	14.8	24.0	33.3	10.0	27.3
d. manual double entry	7.4	8.0	0.0	20.0	27.3
e. purchased computer system	0.0	0.0	8.3	0.0	0.0
f. computer system you designed	0.0	0.0	0.0	0.0	0.0
g. mail-in service	0.0	0.0	0.0	0.0	9.1
High Setup Costs	22.3	32.0	41.7	30.0	63.6*
2. REPORTS GENERATED					
a. enterprise budgets	11.5	16.2	25.0	20.0	40.0
b. balance sheets	61.5	58.3	75.0	70.0	90.0
c. income statements	84.6	70.8	41.7	90.0	100.0
d. cash flow budget	15.4	54.2	25.0	50.0	60.0
e. actual to projected cash flow	3.8	37.8*	25.0	40.0	40.0
3. USES OF REPORTS					
Providing Reports To:					
a. tax authorities	100.0	84.0	100.0	88.9	100.0
b. gov't agencies	18.5	32.0	41.6	55.6	100.0
c. lenders	66.7	68.0	50.0	88.4	70.9
d. landlords	22.2	4.0	0.0	11.1	27.3
e. investors	11.1	4.0	0.0	0.0	9.1
Internal Uses:					
f. analyzing profitability	14.8	20.0	25.0	33.3	27.3
g. monitoring cash flow	44.4	56.0	25.0	88.9	54.5
h. monitoring inventory	22.2	40.0	25.0	55.6	54.5

* Indicates that this mean is different from all other size categories' means at a ten percent significance level using a test based on binomial probability distributions (Hogg and Tanis, p. 343)

Table 3. Accounting Systems, Reports, and Uses of Accounting Reports by Internal Use Category -- Ohio, 1987.

	Grain Farms[1] (400 - 800 acres)		Dairy Farms[1] (40 - 60 cows)	
	Int.	No Int.	Int.	No Int.
No of farms	22	21	21	15
1. TYPE OF ACCOUNTING SYSTEM				
	% of farms			
a. check stubs, bills, and receipts	22.7	20.0	4.8	31.6*
b. farm record book	40.9	46.7	52.6	52.6
Low Setup Costs	63.6	66.7	61.9	84.2*
c. manual single entry	27.4	26.7	9.5	10.5
d. manual double entry	4.5	6.6	4.8	0.0
e. purchased computer system	4.5	0.0	9.5	5.3
f. computer system you designed	0.0	0.0	9.5	0.0*
g. mail-in service	0.0	0.0	4.8	0.0
High Setup Costs	36.4	33.3	38.1	15.8*
2. REPORTS GENERATED				
a. enterprise budgets	19.0	20.0	19.0	13.6
b. balance sheets	71.4	53.3	61.9	54.5
c. income statements	66.7	53.3	81.0	72.7
d. cash flow budget	47.6	20.0*	38.1	9.1*
e. actual to projected cash flow	47.6	13.3*	19.0	10.0*

* Indicates that the internal use categories means differ significantly at a ten percent significance level using a test based on binomial probability distributions (Hogg and Tanis, p. 343).

[1] "Int" indicates internal use of accounting reports while "no int" means that accounting reports were not used for internal uses.

Table 4. Accounting Systems, Reports, and Uses of Accounting Reports by Size of Dairy Farm -- Ohio, 1987.

	No. of Cows			
	20-40	40-60	60-80	>80
No. of farms	34	43	24	22
1. TYPE OF ACCOUNTING SYSTEM	% of farms			
a. check stubs, bills, and receipts	28.6	17.5	19.2	22.2
b. farm record book	48.6	55.0	42.3	11.1*
Low Setup Costs	77.2	72.5	61.5	33.3*
c. manual single entry	17.1	10.0	11.5	11.1
d. manual double entry	2.9	2.5	0.0	27.8
e. purchased computer system	2.9	7.5	15.4	5.6
f. computer system you designed	2.9	5.0	7.7	0.0
g. mail-in service	0.0	2.5	3.8	22.2
High Setup Costs	22.8	27.5	38.5	66.7*
2. REPORTS GENERATED				
a. enterprise budgets	23.5	16.3	33.3	23.8
b. balance sheets	52.9	58.1	62.5	66.7
c. income statements	82.4	76.7	79.2	76.2
d. cash flow budget	35.3	23.3	29.2	52.4
e. actual to projected cash flow	11.8	14.0	16.7	33.3
3. USES OF REPORTS				
Providing Reports To:				
a. tax authorities	97.2	95.3	92.6	85.7
b. gov't agencies	52.8	51.2	59.3	52.4
c. lenders	55.6	62.8	44.4	57.1
d. landlords	0.0	2.3	3.7	0.0
e. investors	2.8	0.0	7.4	4.8
Internal Uses:				
f. analyzing profitability	30.6	30.2	33.3	23.8
g. monitoring cash flow	30.6	37.2	25.9	52.4
h. monitoring inventory	30.6	23.3	33.3	52.4*

* Indicates this mean is different from all other size categories' means at a ten percent significance level using a test based on binomial probability distributions (Hogg and Tanis, p. 343).

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